

REVISED DRAFT

SAMPLING AND ANALYSIS PLAN POST REMOVAL SAMPLING

Bonneville Dam Project Cascade Locks, Oregon

January 2003

Prepared for:



U.S. Army Corps of Engineers
Portland District
333 SW First Avenue
Portland, Oregon 97208-2946

Prepared by:



111 S.W. Columbia, Suite 900
Portland, Oregon 97201-5814
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The U.S. Army Corps of Engineers (USACE) has contracted URS Corporation (URS) to collect sediment samples offshore of Bradford Island. The information collected will be used to determine the nature and extent of contamination remaining after the retrieval of in-water debris offshore of Bradford Island.

Bradford Island is part of the Bonneville Lock and Dam, located within the Columbia River, near Cascade Locks, Oregon. The Bonneville Lock and Dam is located on the Columbia River at river mile 146.1, approximately 40 miles east of Portland, Oregon. USACE is the owner of the Bradford Island Landfill, and is in the process of investigating the landfill. USACE is conducting the landfill investigation under the oversight of the Oregon Department of Environmental Quality (DEQ), through the Voluntary Cleanup Program.

This Sampling and Analysis Plan (SAP) addresses the Detailed Statement of Work prepared by the USACE for Contract No. DACW57-99-D-0005, Task Order No. 0004, Modification 006: Bradford Island Post Removal Sampling (dated June 27, 2002). The work described within this SAP will occur in the water off the north and east shorelines of Bradford Island, and in the area of the catch basin system located just west of the landfill (near the sandblast building).

This SAP is one of the four components that constitute the Management Plans for this phase of work at the Bradford Island site. The Management Plans include a Work Plan, this SAP, an Accident Prevention Plan, and a Dive Safety Plan. The SAP has two major components: Part I - the Field Sampling Plan (FSP) and Part II - the Quality Assurance Project Plan (QAPP). The FSP presents the detailed scope of work associated with field activities (e.g., sample groups and sample locations) and specifies the procedures to be used for sampling and other field operations. The QAPP describes the analytical data quality objectives, laboratory analytical procedures, quality assurance and quality control (QA/QC) procedures, and data quality evaluation criteria.

The purpose of the SAP is to establish procedures that will produce high quality data that meet the project objectives and requirements and accurately characterize measurement parameters. This SAP provides the protocols for collecting samples, measuring and controlling data, and documenting field and laboratory data.

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LIST OF ABBREVIATIONS

AVS	acid volatile sulfide
AWS	auxiliary water supply
CFS	cubic feet per second
COC	Chain-of-Custody
CQAB	USACE Chemical Quality Assurance Branch
CQR	contractor quality control
DEQ	Oregon Department of Environmental Quality
DOC	dissolved organic carbon
DQCR	daily quality control report
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
GPS	global-positioning system
IDW	investigation derived waste
K _w	Kilowatts
LIMS	laboratory information management system
MSL	mean sea level
MS/MSD	matrix spike/matrix spike duplicate
NWTPH-Dx	northwest total petroleum hydrocarbons-diesel and heavy oil range
PCBs	polychlorinated biphenyls
PCOI	preliminary contaminant of interest
PPE	personal protective equipment
PSEP	Puget Sound Estuary Program
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance and quality control
SAP	Sampling and Analysis Plan
SEM	simultaneously extractable metals
SOP	standard operating procedure
SOW	Statement of Work
SVOCs	semivolatile organic compounds
TOC	total organic carbon
TSS	total suspended solids
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USFS	United States Fish and Wildlife
VOCs	volatile organic compounds

1.0 PROJECT DESCRIPTION

Bradford Island is located in the southwest quadrant of Section 22, Township 2 North, Range 7 East, Willamette Meridian, and within the state of Oregon. Bradford Island is part of the Bonneville Lock and Dam, which spans the Columbia River between Oregon and Washington (Figure 1-1). The Bradford Island Landfill is a former waste disposal site, situated on the eastern (upstream) end of Bradford Island.

During hydrographic and underwater dive surveys conducted in October and November 2000, the U.S. Army Corps of Engineers (USACE) identified the presence of waste-related items submerged in the Columbia River, just offshore of the landfill. Some of these items included electrical components that contained polychlorinated biphenyls (PCBs). Most of the identified electrical items were located near three debris piles located in shallow water, along the north and east shorelines of the island. USACE conducted an investigation of the river to help assess the extent and impacts of site-related contaminants. The scope of the investigation was based on Oregon Department of Environmental Quality (DEQ) and United States Fish and Wildlife (USFW) input and included sampling and analysis of water, sediment, and benthic aquatic specimens. PCBs were detected in all matrices. The findings of this investigation are presented in the In-Water Investigation Report, Bradford Island Landfill (URS, 2002a). The in-water debris was removed in February and March, 2002. The removal activities are described in the Technical Memorandum, In-Water Removal Work (URS, 2002b).

This Sampling and Analysis Plan (SAP) consists of a Field Sampling Plan (FSP) in conjunction with the Quality Assurance Project Plan (QAPP). The FSP was prepared in general accordance with Bradford Island Post Removal Sampling project (hereinafter referred to as “post removal sampling”) outlined in the Detailed Statement of Work prepared by the USACE for Contract No. DACW57-99-D-0005, Task Order No. 0004, Modification No. 006 (dated June 27, 2002). The FSP provides the detailed scope of work for field activities (e.g., sample groups, sample locations, etc.) and specifies the procedures to be used during the post removal sampling at Bradford Island.

The purpose of this investigation is to establish the nature and extent of contamination remaining in the sediments after the removal of debris and to collect data that may be used in a Level 1 and Level II Ecological and Human Health Risk Assessment.

1.1 SITE LOCATION AND FEATURES

The Bonneville Dam is the most downstream dam within the Columbia-Snake River navigation system that consists of eight locks and dams. The dam is located at 45° 38. 27 N - 121° 56. 31 W. Bonneville Lock and Dam create a 48-mile-long reservoir from the Bonneville Dam upstream to the Dalles Dam. The river at the dam is divided into three channels by two islands, Bradford and Cascade Islands. The tailrace for the first powerhouse forms one channel, the

spillway channel the middle channel, and the tailrace channel for the second powerhouse the third channel (Figure 1-2).

The major features of the dam complex include the spillway, two powerhouses, two navigation locks, and a fish hatchery. The fish hatchery, main office, and navigation lock visitor center are located on the Oregon shore of the Columbia River. A warehouse and automotive garage facility, and navigation lock support facilities are located on Robins Island. The major features on Bradford Island include the visitor center, fish ladders, the service center building, the equipment building, and the sandblast building. A fish ladder is also located on Cascades Island, and a second visitor center is located on the north shore of the Columbia River in Washington State.

The old navigation lock is located adjacent to the first powerhouse and is no longer in use. The upstream side of the old navigation lock consists of an end sill where the lock doors are located that extends from the riverbed to an elevation of 40 feet mean sea level (msl). The current navigation lock is located immediately south of the old navigation lock and has an end sill that extends up to an elevation of 51 feet msl.

The first powerhouse has a flow capacity of approximately 128,000 cubic feet per second (cfs) and a rated power output of 526,700 kilowatts (kW) (USACE, 2000). The second powerhouse has a flow capacity of approximately 160,000 cfs and a rated power output of 558,200 kW (USACE, 2000).

The normal operating range for the Bonneville pool is between 71.5 feet msl elevation and 76.5 feet msl as measured at the dam. The tailwater elevation varies in direct relationship to the river flow from about 7.0 feet msl at 70,000 cfs to 36.3 feet msl at a river flow of 660,000 cfs (USACE, 1998).

An authorized federal navigation channel in this reach of the river is 300 feet wide and 27 feet deep, although the depth is currently maintained at 17 feet (USACE, 1991). Bathymetric surveys conducted by the USACE indicate that the depth of the pool near the Bonneville Dam ranges from a few feet to over 100 feet.

The spillway is a concrete, gravity structure with eighteen 50-foot-wide bays separated by 10-ft-wide piers. The spillway releases are controlled by eighteen 50-foot-wide by 60-ft-high spillway gates. The crest of the spillway is at 24.0 feet msl.

The landfill site is in the northeast corner of Bradford Island and is located within the State of Oregon. The landfill is not currently used as a part of the routine operation of the Bonneville Lock and Dam and is managed long term as a wildlife habitat for geese under the Bonneville Master Plan. The elevation of the ground surface on the east side (upstream side) of Bradford Island ranges from 110 feet msl to 130 feet msl.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 INTRODUCTION

This section defines the overall project organization, identifies the project team, indicates each team member's responsibilities, and provides URS' approach to management of the project team.

The primary members of the project team are listed below. The following is a brief discussion of the project team members' responsibilities.

2.2 USACE PROJECT MANAGER – MARK DASSO

The USACE Project Manager is responsible for directing the removal action in accordance with the USACE scope of work. He will monitor project progress by reviewing the monthly reports provided by the URS Project Manager. The USACE Project Manager may initiate delivery order modifications to address changing project requirements or unforeseen circumstances, if such modifications are deemed necessary to achieve the project objectives. He will be notified by telephone and email in advance of fieldwork by the URS Project Manager. Mr. Dasso's phone number is (503) 808-4728.

2.3 USACE TECHNICAL MANAGER – PAUL HUEBSCHMAN

The USACE Technical Manager will work with the URS Project Manager and URS Field Manager to ensure the work is completed in accordance with USACE engineering manuals and regulatory guidance. The USACE Technical Manager may initiate delivery order modifications to address changes to project requirements. Mr. Huebschman will be notified by telephone and e-mail in advance of the fieldwork by the URS Project Manager. Mr. Huebschman's phone number is (503) 808-4914.

2.4 USACE SITE CONTACT – BRIAN MCCAVITT

The USACE Site Contact will coordinate the site work. Primary tasks will include providing access to the Bradford Island Landfill site and notifying USACE personnel of sampling activities at the site. Mr. McCavitt will be notified by telephone and e-mail in advance of fieldwork by the URS Project Manager. Mr. McCavitt's phone number is (541) 374-4575.

2.5 USACE DIVE SAFETY OFFICER – DON HIBBS

The USACE Dive Safety Officer will review the dive safety plan generated by the dive contractor for compliance with USACE requirements. He will also provide oversight of the contractor on diving specific issues. Mr. Hibbs' phone numbers are (541) 374-4591 (office) and (541) 980-1900 (mobile).

2.6 DEQ PROJECT MANAGER – MATT McCLINCY

The DEQ Project Manager may provide oversight during field activities at the Bradford Island Landfill site. He will be notified by telephone at least five days before starting field work by a USACE representative. Issues or concerns identified by the DEQ Project Manager will be directed to the USACE Project Manager, Mark Dasso. Mr. McClincy's phone number is (800) 452-4011.

2.7 URS PROJECT MANAGER – JEFF WALLACE

The URS Project Manager has overall responsibility for project activities and monitoring of the project progress. The URS Project Manager is responsible for planning, scheduling, cost control, and documenting completion of project tasks. The Project Manager also has overall responsibility for the development and implementation of this Work Plan, for monitoring the quality of the technical and managerial aspects of the project, interfacing with the USACE, and ensuring the timeliness of project deliverables. The URS Project Manager can be reached by telephone at (503)-948-7242.

2.8 URS ANALYTICAL CHEMISTRY TASK MANAGER – MADI NOVAK

The Analytical Chemistry Task Manager will be the QA manager for analytical chemistry. She will perform oversee the analytical laboratories and direct the review of chemical data. She will work closely with the URS Project Manager, the URS Field Manager, and the analytical laboratory. The Analytical Chemistry Task Manager can be reached by telephone at (503) 478-2766.

2.9 URS FIELD MANAGER – CHRIS MOODY

The URS Field Manager is responsible for coordinating and overseeing the field and field laboratory operations conducted by URS, including compliance with the SAP, change orders, scheduling, liaison with USACE, sample record-keeping, and inventorying and documenting waste removal activities. The URS Field Manager will also function as the Site Health and Safety Officer, and will be responsible for implementing of the Accident Prevention Plan, including reviewing its contents with project personnel, confirming that personnel have received the required health and safety training, determining personal protection levels, providing necessary personal protective equipment and supplies, and correcting any unsafe work practices. The URS Field Manager can be reached by telephone at (503)-948-7208.

2.10 URS INDEPENDENT TECHNICAL REVIEWER – DAVID WEYMANN

The URS Independent Technical Reviewer will perform an independent technical review of all project deliverables prepared under this contract and delivery order. The reviewer will not be

involved in the preparation of the documents. The Independent Technical Reviewer can be reached by telephone at (503) 478-2769.

2.11 SUBCONTRACTORS AND SERVICES

Table 2-1 lists subcontractors and the services they will provide for this project.

3.0 SCOPE AND OBJECTIVES

The detailed Statement of Work (SOW; date June 27, 2002a) provided to URS by the USACE required preparation of plans to investigating the nature and extent of contamination in the Bonneville forebay area, due to the presence of the waste-related items. Specific sampling objectives are to:

- Collect data to define the nature and extent of sediment impacts
- Evaluate upstream contributions to sediment impacts
- Define preliminary contaminants of interest (PCOIs)
- Collect data for the risk scoping process
- Collect data for the risk screening process

Data quality objectives for each sample group are discussed in the work plan in Table 5-1.

The results of this investigation will be used to identify potential problem chemicals or areas within the Bonneville forebay, make decisions for additional investigations, and to attempt to link chemical sources to sediment contamination. The identification of potential problem chemicals or areas will be based on exceedances of the screening level risk assessment.

4.0 FIELD ACTIVITIES

The following section describes in detail the sampling methods and procedures for the Bradford Island Landfill Post Removal Sampling. Ten sample groups will be collected in order to define the nature and extent of sediment contamination. Two sample groups will be collected in order to provide information for fate and transport and risk assessment conceptual modeling. The sample groups are listed in Table 4-1 along with sample methods and analyses. Table 4-2 details the priority of sampling method for each area. Table 4-3 lists the order in which sediment samples will be collected. Figure 4-1 presents a summary of sample locations. Figures 4-2 through 4-5 present sample location coordinates.

4.1 SOURCE AREA SEDIMENT SAMPLING

The following sections describe the locations and procedures for the collection of sediment samples in the area of the former debris piles and catchbasin outfalls. Three sample groups will be collected within the source area: temporal samples, grid samples, and transect samples. A sample summary describing the sample groups and collection methods is presented in Table 4-1. Collection of sediment samples from the source areas will assist in the characterization of the nature and extent of sediment contamination.

4.1.1 Sample Locations

Sample locations and coordinates are presented on Figure 4-2. With the exception of two the temporal sediment samples (see Section 4.1.1.2), sediment sampling locations are approximate. If the amount of sediment available at the intended sample location is not adequate for sample analysis, the sample location may be field determined according to sediment availability within approximately ten feet of the original sample coordinates.

Surface samples will be collected at a zero to six-inch depth interval at all source area locations. If the surface sample is collected less than the six-inch depth interval due to a rocky subsurface, the actual sediment sampling depth will be noted. Subsurface sample collection will be attempted in areas that may be depositional (between Pile #3 and the spillway, as described in Section 5.1 of the Work Plan). Previous investigations in the source area east of Pile #3 have established that the river bottom consists mostly of gravel and cobble and that subsurface sampling is not feasible.

4.1.1.1 Temporal

Samples will be collected in areas previously sampled in order to determine whether temporal changes in sediment contamination exist.

A total of four surface sediment samples will be collected. Two of the sediment samples will be collected at locations previously sampled and exhibiting high PCB Aroclor concentrations. global positioning system (GPS) coordinates are known for these two samples. Two additional

sediment samples will be collected from areas from which highly contaminated sediment was removed. While GPS coordinates are not available for these locations, the vicinity is known, and samples will be collected from these areas.

4.1.1.2 Grid

Unbiased sampling in the source area in a grid formation will assist in the characterization of nature and extent of contamination. The grid sampling scheme allows for good coverage of this area and to allows a higher level of confidence in detecting areas of elevated sediment impacts.

Thirty-six surface samples will be collected at regular intervals from within a grid encompassing the source areas (i.e., former debris piles and catchbasin outfalls). Of these 36 locations, subsurface sampling will be attempted in 19 locations (Figure 4-2) and up to eight samples will be submitted for analysis. If more than eight subsurface samples are retrieved, samples will be selected for analysis based on visual observation of grain size (i.e., the more fine grained samples will be submitted for analysis)

4.1.1.3 Transect

Unbiased sampling in the source area in a transect formation will assist in the characterization of the lateral extent of contamination.

Sixteen surface samples will be collected along transects originating in the source areas and extending beyond the area encompassed by the grid. Of these 16 locations, subsurface sampling will be attempted in 6 locations.

4.1.2 Sample Methods

Sediment samples will be collected using one of two methods: a standard sampling method or with diver assistance. Standard sampling methods, including a box core or grab sampler (e.g., Van Veen or ponar) will be attempted first at the potential depositional locations noted on Figure 4-2. The standard operating procedures (SOP) for standard sampling methods are presented in Appendix A. If sediment is not retrieved with a standard sampling method, a diver will collect a surface sample with a stainless steel spoon. The diver will position the container down current in an attempt to capture any fines, and will place sediment into the container. The sampling method priority is presented in Table 4-2.

After a sample is collected, it will be given to URS for logging and proper handling and labeling. The following information will be noted for each sediment sample and recorded on a sediment sampling form (Appendix B):

- Sediment samples will be classified by a URS geologist according to the Unified Soil Classification System.
- Depth from which the sediment was collected, based on the diver's estimate (e.g., 0-2, 0-6, 6-18 inches).

- Physical characteristics of the sediment, including color, texture, odor/sheen, benthic organisms, depth of bioactive layer, vegetation, presence of grit, and any other observations.
- Sample location coordinates will be collected using a hand-held range finder and precise GPS equipment to establish the coordinates of the sample location. The hand-held range finder will pinpoint the location of the diver, and the GPS equipment will establish the coordinates of that location. GPS equipment used will provide sub-meter accuracy.
- Water depth at each sample location will be collected. This information will be collected from the boat depth sounder the requested from the dive master.
- Samples will be collected in precleaned and certified (under chain-of-custody) containers supplied by the contract analytical laboratory (Table 4-4). Each sample will be given a unique sample identification number. The samples will be labeled according to the procedure outlined in Section 5.3 of this FSP. Each cooler should contain enough ice to maintain the samples at 4°C + 2°C during continued sample collection and shipping.
- Non-dedicated sampling equipment will be decontaminated as specified in Appendix A.

4.1.3 Sample Analysis

Sediment samples will be submitted to the contract laboratory for analysis. Analytical testing is summarized in Table 4-1. Extra volume will be collected for all samples and will be frozen and archived at the laboratory for one year for future potential analysis.

4.2 POTENTIAL DEPOSITIONAL SEDIMENT SAMPLING

The following sections describe the locations and procedures for the collection of sediment samples in potential depositional areas. Potential depositional areas are defined as those locations modeled by the USACE to exhibit relative low bottom velocity. (Refer to the Work Plan for discussion of depositional areas.) Two sample groups will be collected within the depositional areas: depositional samples and a southeast side of Bradford Island sample. A sample summary describing the sample groups and collection methods is presented in Table 4-1. Collection of sediment samples in the potential depositional areas will assist in the characterization of the nature and extent of sediment contamination.

4.2.1 Sample Locations

Sample locations and coordinates are presented on Figure 4-3. Surface samples will be collected at the zero to six-inch depth interval. Subsurface sample collection will be attempted at the six to 18-inch depth interval. Previous investigations have established that the river bottom consists mostly of course grained materials (sand to cobbles), making sampling at subsurface depths infeasible. However, the potential depositional sampling locations have been located specifically to capture areas likely to be affected by sediment deposition. Therefore, subsurface sample collection will be attempted in these locations.

4.2.1.1 Depositional

Bonneville Dam Forebay locations modeled to experience relative low velocities may be depositional. These modeled locations will be sampled to determine if impacted sediments are transported from the source area to the depositional zones.

Thirteen surface and 13 subsurface samples will be collected in areas that may be depositional.

4.2.1.2 Southeast Side of Bradford Island

Sample collection will be attempted off of the southeastern shore of Bradford Island. This area was not modeled as a depositional zone, however due to detections of PCBs downstream of source former Pile #1, sample collection will be attempted in this area. Sample collection will be attempted at 100-foot intervals for a total of 14 attempted sample locations. One surface and one subsurface samples that exhibit depositional characteristics (i.e., exhibit higher percentages of fine-grained sediments) will be selected for analysis. Sample locations and coordinates are presented on Figure 4-3.

4.2.2 Sample Methods

Sediment samples will be collected using the following methods. Sample collection will first be attempted with a box core sediment sampler. The box core sampler will be used, if possible, in order to use sampling techniques consistent with recent USACE sampling (USACE, 2002b) and in order to retrieve sediment up to a depth of 18 inches. If the box core sampling method does not collect adequate sample volume, a sediment grab-sampling device will be deployed, such as a Van Veen or ponar. A grab-sampling device is effective in retrieving most types of sediment. Box corer and grab sediment sampling protocols are presented in Appendix A. The sampling method priority is presented in Table 4-2.

The recovered sample will be logged and labeled. The following information will be noted for each sediment sample and recorded on a sediment sampling sheet (Appendix B):

- Sediment samples will be classified by a URS geologist according to the Unified Soil Classification System.
- Depth from which the sediment was collected (e.g., 0-2, 0-6, 6-18 inches).
- Physical characteristics of the sediment, including color, texture, presence of grit, presence and type of biological structures, other debris, or odors.
- Sample location coordinates will be collected using a hand-held range finder and precise GPS equipment to establish the coordinates of the sample location. The hand-held range finder will pinpoint the location of the diver, and the GPS equipment will establish the coordinates of that location. GPS equipment used will provide sub-meter accuracy.
- Water depth at each sample location will be collected. This information will be collected from the boat depth sounder the requested from the dive master.

- Samples will be collected in precleaned and certified (under chain-of-custody) containers supplied by the contract analytical laboratory (Table 4-4). Each sample will be given a unique sample identification number. The samples will be labeled according to the procedure outlined in Section 5.3 of this FSP. Each cooler should contain enough ice to maintain the samples at 4°C + 2°C during continued sample collection and shipping.
- Non-dedicated sampling equipment will be decontaminated as specified in Appendix A.

4.2.3 Sample Analysis

Sediment samples will be submitted to the contract laboratory for analysis. Analytical testing for surface sediment samples is summarized in Table 4-1. Extra volume will be collected for all samples and will be frozen and archived at the laboratory for one year for future potential analysis.

4.3 GOOSE ISLAND SAMPLING

The sediments around Goose Island may be impacted from either transport from the source areas or from sediments taken from the south side of Bradford Island to construct the island. Previous sediment and tissue sampling indicate that PCBs were detected in both media. Samples will be collected to establish the nature and extent of the contamination and to determine whether Goose Island is a source of contamination.

Three surface and three subsurface sediment samples will be collected offshore of Goose Island. Two surface (6 inches below ground surface) soil samples will be collected upland on Goose Island. Sample results will assist in the characterization of the extent of contamination from the source area. In addition, results may establish whether Goose Island is a source of contamination due to the materials used for its construction.

4.3.1 Sample Locations

Sample locations and coordinates are presented on Figure 4-4 and sample coordinates are listed in Table 4-1. Upland soil sample locations will be field selected to represent the east and west areas of the Island.

4.3.2 Sample Methods

Sediment samples will be collected using the same method used to collect potential depositional samples (box corer or grab sampling). This method is detailed in Section 4.2.2.

Soil samples will be collected with a hand auger six inches below the ground surface.

4.3.3 Sample Analysis

Samples will be submitted to the contract laboratory for analysis. Analytical testing for samples is summarized in Table 4-1. Extra volume will be collected for all samples and will be frozen and archived at the laboratory for one year for future potential analysis.

4.4 FISH LADDER DISPOSAL PILE

Sediment that collects in the fish ladder is cleaned out and deposited on the south (upland) side of Bradford Island. The sediment that collects in the fish ladder is depositional and may have been impacted by contaminated sediments. The disposal piles will be sampled to establish whether impacted sediments are transported into the fish ladder.

4.4.1 Sample Locations

One sample will be collected from the fish ladder disposal piles. Approximate sample locations are presented on Figure 4-3.

4.4.2 Sample Methods

One composite sample will be collected from the pile. Five aliquots will be collected per sample using a hand auger. The aliquots will be collected at least six inches beneath the pile surface. The aliquots will be composited in a stainless steel bowl and placed in sample containers.

Non-dedicated sampling equipment will be decontaminated as specified in Appendix A.

4.4.3 Sample Analysis

Samples will be submitted to the contract laboratory for analysis. Analytical testing for samples is summarized in Table 4-1. Extra volume will be collected for all samples and will be frozen and archived at the laboratory for one year for future potential analysis.

4.5 REFERENCE SEDIMENT SAMPLING

Reference sediment samples will be collected upstream of the extent of impact of Bradford Island contaminated sediments. The reference sediment samples may indicate presence of any upstream contamination transport into the Bonneville forebay area. In addition, background metals results may be compared to site metals results in order to establish whether site concentrations are below, at, or above background levels.

4.5.1 Sample Locations

Two surface sediment samples will be collected from the zero to six-inch depth interval. Sample location coordinates are depicted on Figure 4-3.

4.5.2 Sample Methods

Sediment samples will be collected using the same method used to collect source area samples (a scuba diver will collect samples with a spoon). This method is detailed in Section 4.1.2.

4.5.3 Sample Analysis

Surface samples will be submitted to the contract laboratory for analysis. Analytical testing for surface sediment samples is summarized in Table 4-1. Extra volume will be collected for all samples and will be frozen and archived at the laboratory for one year for future potential analysis.

4.6 SEDIMENT CONTAMINANT BIOAVAILABILITY ANALYSIS

Selected sediment samples will be analyzed for parameters that may indicate the fate and transport and bioavailability of contaminants in sediment.

4.6.1 Sample Locations

Samples that will be analyzed for the bioavailability parameters are depicted on Figure 4-5.

4.6.2 Sample Methods

Sample methods will be identical to those used to collect sediment for chemistry analysis.

4.6.3 Sample Analysis

Samples will be submitted to the contract laboratory for analysis. Analytical testing for samples is summarized in Table 4-1.

4.7 WATER COLUMN SAMPLING

Water column sampling and monitoring will be conducted for physical parameters. The results will assist in characterization of sediment contaminant transport and contaminant availability to potential receptors.

4.7.1 Sample Locations

Water column samples will be collected at ten locations. Sample locations and coordinates are depicted on Figure 4-5.

4.7.2 Sample Methods

Water column samples will be collected with a Kemmerer discrete depth water sampler. The sampler is attached to a cable and enters the water in the open position. A messenger is sent

down the cable to activate closure of the sampler. Kemmerer sampling protocols are presented in Appendix A.

In order to minimize sediment disturbance before water column samples are collected, thereby increasing the total suspended solids, water samples will be collected before sediment samples are collected.

A water quality meter will be deployed concurrent with the water sampler. Upon stabilization of readings, conductivity, temperature, dissolved oxygen, pH, turbidity, and reduction-oxidation potential will be recorded on a water sampling form (Appendix B).

Sample location coordinates will be collected using a hand-held range finder and precise GPS equipment to establish the coordinates of the sample location. The hand-held range finder will pinpoint the location of the diver, and the GPS equipment will establish the coordinates of that location. GPS equipment used will provide sub-meter accuracy.

Water depth will be collected at each sample location. This information will be collected from the boat depth sounder the requested from the dive master.

Samples will be collected in precleaned and certified (under chain-of-custody) containers supplied by the contract analytical laboratory (Table 4-5). Each sample will be given a unique sample identification number. The samples will be labeled according to the procedure outlined in Section 5.3 of this FSP. Each cooler should contain enough ice to maintain the samples at 4°C + 2°C during continued sample collection and shipping.

Non-dedicated sampling equipment will be decontaminated as specified in Appendix A.

4.7.3 Sample Analysis

Samples will be submitted to the contract laboratory for analysis. Analytical testing for samples is summarized in Table 4-1.

4.8 SITE-SPECIFIC SAMPLING AND ANALYSIS CONTINGENCIES

Site-specific sampling and analysis problems could be encountered during sampling. The following contingencies have been developed to address potential field problems.

- During previous sediment investigations in the Bonneville forebay area there was difficulty in recovering adequate volume of sediment for sample analysis. The near shore area of Bradford Island was observed to consist of cobble-size particles with small pockets of fine-grained sediment in between the cobbles. Sample collection was attempted at locations throughout the Bonneville forebay area with a box core sampler. Sediment was not retrieved in many of these areas. Attempts will be made to collect samples at pre-determined locations, however due to the difficulty experienced in collecting adequate sample volume the actual location may be field determined in areas of retrievable sediment.

- Due to shipping logistics - such as drop off times and locations - it may not be feasible to ship QA samples to USACE the same day that they are collected. If QA samples cannot be shipped the same day, they will be stored on ice in a cooler under chain of custody and shipped the following day.

4.9 FIELD QA/QC SAMPLING

Seven and four field duplicate samples will be submitted to the contract and USACE Chemical Quality Control Branch laboratory, respectively. One equipment rinsate blank for every day of sampling and four matrix spikes (MS) and matrix spike duplicates (MSD) will be submitted to the contract laboratory. Field QC sampling is summarized in Table 4-3.

The field duplicate, MS, and MSD samples all will be collected from primary sample locations that require the full suite of analytical testing. The collection procedures for the duplicate, MS, and MSD will follow those outlined for the primary sediment samples.

Two additional field duplicates will be collected to establish the variability that may be introduced by different sampling techniques. These duplicates will be collected at any two depositional sampling locations for which adequate sediment sample volume was retrieved using a box core device.

The equipment rinsate blank will be collected when it is necessary to use non-dedicated equipment. Non-dedicated equipment will be decontaminated following the procedures outlined in Appendix A. The rinsate blank will consist of laboratory-provided analyte-free water collected from the final rinse of sampling equipment after completion of decontamination procedures. The blank will be collected after decontamination from the final rinse of sampling equipment.

5.0 SAMPLE CHAIN-OF-CUSTODY DOCUMENTATION

This section describes sample handling and documentation procedures. The procedures described are designed to provide a thorough record of the sampling events. The recordkeeping procedures are designed to provide information to allow useful interpretation of the data.

5.1 FIELD LOGBOOKS

Permanently bound field books with waterproof paper will be used as the field logbooks for this project because of their compact size, durability, and secure page binding. The pages of the logbook should be numbered consecutively and should not be removed for any reason. Entries will be made in black waterproof indelible ink.

Logbooks will document the procedures performed by field personnel. Each entry should be dated, legible, and contain accurate and complete documentation of the individual's activities. Documentation in the field logbook will be at a level of detail sufficient to explain and reconstruct field activities without relying on recollection by the field team members. Because the logbook is a complete documentation of field procedures, it should contain only facts and observations. Language should be objective, clear, concise, and free of personal interpretation or terminology that might be misconstrued.

No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change.

Field logbooks will be identified by the project name and a project-specific number (e.g., "Bradford Island Post Removal Sampling, Project Number 25692710"), and stored in the field project files when not in use. Field logbooks will be photocopied after the field investigation, and photocopies will be stored in the project files. After field activities are completed, logbooks will be stored in the permanent project file.

5.2 VIDEO AND PHOTOGRAPHS

A video camera will document all of the diver activities. The camera is attached to the diver's helmet. Sound, including the dialog between the diver and dive master, will be recorded.

Representative photographs will be taken during the field investigation activities for the following reasons: (1) to help identify sampling locations, and, (2) to document field activities or field observations.

Information about each photograph will be entered into the logbook immediately after the photograph has been taken. Each slide or photographic print will be labeled with the time and date of the photograph, site location, frame (if applicable), and roll number (if applicable). If available, a digital camera will be used with date-back capabilities to automatically imprint the photograph with the time and date. Alternatively, a standard camera may be used.

5.3 SAMPLE NUMBERING SYSTEM

Sediment samples collected during the post removal sampling will be numbered as follows:

- The first six numerals will represent the date, as year, month, day of sample collection (e.g., 021112 = November 12, 2002).
- The next three letters will designate the work site (“IW” for “in-water”, “AWS” for “auxiliary water system”, “GI” for “Goose Island”, “FLP” for “fish ladder disposal piles”, “RF” for “reference”).
- The next two numerals will represent consecutive sample numbers for a given site (e.g., 01, 02, 03).
- The last two letters will designate the sample matrix (e.g., SD = sediment sample).
- A field duplicate sample will be labeled with a separate consecutive sample number (except for the duplicate samples that are sent to the USACE CQAB laboratory, which will be labeled identically to the respective primary sample).

An example of a sample identification number for the fourth sediment sample collected on November 12, 2002 is 021112IW04SD. No dashes or slash marks will be used to separate integers within the sample number.

5.4 SAMPLE DOCUMENTATION

Detailed information such as the circumstances of collection and disposition of samples results in a well-documented investigation. Accurate sample and project records and proper chain-of-custody procedures are imperative.

The purposes of establishing documentation procedures for this investigation are to:

- Provide a complete record of procedures as performed in the field.
- Permit accurate identification of samples and tracking of their status.
- Facilitate chain-of-custody and traceable accountability procedures for samples.
- Facilitate retention of project records.

Verifiable sample custody will be an integral part of field and laboratory operations. Sufficient documentation will be made in the field and laboratory to document sample collection preservation, and identification. The following sections specify the procedures to be used for field documentation.

5.4.1 Sample Labels

Sample containers will be labeled before collecting each sample using a permanent waterproof marker. The following information will be recorded on each sample label:

- Site name
- Sampling date
- Sampling time
- Sample identification number
- Preservative used if applicable
- Initials of sampling personnel
- Requested analysis

5.4.2 Field Sampling Sheets

Field sampling sheets used during the investigation will provide information on sediment and water samples. Examples of these forms are presented in Appendix B.

5.4.3 Chain-of-Custody Records

The primary purpose of a Chain-of-Custody (COC) is to document sample custody and to provide the laboratory with the appropriate analysis request. A separate COC form will accompany each shipping cooler, and contain sample information for only those samples contained in the cooler. The URS Field Investigation Task Manager will retain the sender's copy (last or pink copy) of the COC. This copy will be kept with the project files. Each chain of custody will contain the following information:

- Sample identification number
- Date and time of sampling
- Sample matrix
- Number of sample containers and or volume of sample
- Requested chemical analysis
- Names and signatures of sampling personnel
- Project number
- Any additional notes regarding sample collection or preservation (e.g., field filtered)

COCs sent to the USACE Quality Assurance laboratory will also contain the appropriate laboratory information management system (LIMS) number. For this project, the LIMS number is 5012. Each shipping cooler will be sealed with custody seals. Each custody seal will have the date and the sampler's signature. Custody seals will be attached to the left front and right rear side of the cooler in such a manner that they will be broken if the cooler is opened.

5.5 CORRECTIONS TO DOCUMENTATION

If corrections are required to field documentation including field log book, field sampling sheets, development forms, or COC, the correction will be made in the following manner:

- Draw a single line through the incorrect entry.
- The person making the entry will initial and date the correction.

6.0 SAMPLE PACKAGING AND SHIPPING

6.1 SAMPLE PACKAGING

The procedures and material used for sample packaging must adequately protect the sample containers from accidental breakage during shipment. Sample packaging and will conform to the requirements of Appendix F of USACE Engineering Regulation ER-200-1-3 (USACE, 2001). Glass containers will be placed in plastic bags and will be wrapped and cushioned in inert packing material, such as foam or bubble wrap packing material. Caps will be screwed on tightly, and the containers will be placed into individual, resealable bags, which will then be sealed. Ice will be placed in the container in a manner to promote adequate and equal cooling for all samples.

Ice will be packaged in the following manner. Approximately 1/2 bag of cubed ice will be transferred into a 1-gallon resealable plastic bag. The bag will be sealed and placed inside a second resealable plastic bag. The outer bag will be sealed and taped with duct tape to prevent the bag from opening.

6.2 SAMPLE SHIPPING

Sample containers will be placed inside a strong shipping container, such as a metal or plastic picnic cooler with a hard plastic liner. The shipping container should be sufficient quality to minimize the potential for leaks or spills of ice water or potentially broken sample containers. The drain plug at the bottom of the cooler will be taped shut so that the contents from potential broken containers of prepackaged ice or sample will not escape. The completed COC (minus the sampler's copy) will be placed inside a resealable plastic bag and secured with duct tape to the inside lid of the cooler. The shipping container lid will be adequately secured with tape to prevent opening during shipping. The shipping container will be adequately cleaned between shipments to prevent potential cross-contamination of samples.

Samples will be shipped from the project site to the project analytical laboratory via overnight courier (Federal Express). Field personnel will transport sample shipments from the field to the appropriate Federal Express office. COC forms do not require the signature of the shipping agent.

When possible, samples will be shipped the same day as collection. Due to the location of the project and time constraints for overnight shipping to the eastern US, some shipments may not be sent until the following day. This may be especially true in the case of QA samples sent to the USACE laboratory in Omaha, Nebraska. In such cases, samples will be repacked with fresh ice before shipping.

Samples will only be shipped on Fridays if required by field circumstances and URS has received approval for Saturday delivery from the laboratory.

Samples will be shipped to the laboratory overnight via Federal Express. The contract laboratory address will be included when the laboratory is contracted.

QA samples will be shipped overnight via Federal Express to the following address:

US Army Corps of Engineers
CQAB Lab
Attn: CEWES-EE-Q
420 S. 18th Street
Omaha, NE 68102-2586
Point of contact: Laura Percifield
(402) 444-4313
LIMS #5012

7.0 INVESTIGATION-DERIVED WASTES (IDW)

Proper storage of wastes is necessary to minimize potential spread of contaminated or potentially contaminated media. The following section describes the procedure for containerizing and storing the decontamination water generated accumulated during the sampling.

7.1 WASTE STORAGE AND HANDLING

All decontamination water generated during in-water work, will be stored onsite in removable-head steel 55-gallon capacity drums (DOT 1A2) complete with lids, lid gaskets and bolts. Drums will be transferred to the public sewer system for disposal.

USACE has determined that the personal protective equipment (PPE) is a non-hazardous solid waste. Therefore, PPE will be disposed of in the nearest USACE dumpster.

7.2 DRUM LABELING

IDW drums will be labeled on both the side and lid of the drum using a permanent marking pen. Labels will have the following information:

- Generator's name (U.S. Army Corps of Engineers)
- Project Name (Bradford Island Post Removal Sediment Sampling)
- Name and Telephone number of USACE Project Manager: Paul Huebschman (503) 808-4914
- Description of contents (e.g., Decontamination Water)
- Date
- Drum number of total drums

8.0 CONTRACTOR QUALITY CONTROL

8.1 INTRODUCTION

The URS Field Investigation Task Manager will oversee the fieldwork to ensure that the field team, specifically the sampling team, is cognizant of the overall project objectives as well as any specific sampling and analysis requirements. Contractor quality control (CQC) will be performed in three phases: preparatory, initial, and follow-up. The activities associated with each of the CQC phases will be documented in a daily quality control report (DQCR), as described in Section 8.5. Detailed checklist plans and a description for each CQC phase are provided below.

8.2 PREPARATORY PHASE

Prior to beginning any definable feature of work, the sampling team will review all of the work requirements, inspect all materials and equipment, inspect all work areas to ascertain completion of all preliminary work, and demonstrate all field activities. The checklist below outlines the requirements of the preparatory phase. The sampling team will be responsible for ensuring that the following checklist items are performed:

- Review all work requirements identified in the SAP and the QAPP.
- Calibrate each piece of field equipment during the preparatory inspection meeting using certified calibration standards.
- Discuss the sample custody procedures and sample numbering system, and prepare a full set of custody forms to be used as a reference.

As part of the preparatory phase, the sampling team will physically examine and gather all field equipment and other materials prior to fieldwork. The checklist below summarizes the essential field equipment and materials:

- Personal protective equipment
- Packing tape
- Base map to record sample locations
- QA/QC sample tracking sheets
- Air bills
- Field log books
- Field forms/chain-of-custody records
- Sampling and Analysis Plan
- Instrument operating manuals and procedures for equipment maintenance and repair

- Laboratory bottles with Teflon lids (as needed)

8.3 INITIAL PHASE

The field team is responsible for overseeing every step of each fieldwork task when the work is first initiated. The required elements for the initial phase are indicated in the checklist below:

- Oversee sampling activities and review work for compliance with contract requirements.
- Inspect all sample labels and chain-of-custody forms for accuracy, completeness, and consistency.
- Inspect all coolers to ensure that environmental samples are packaged and shipped properly and check for sample integrity.
- Observe, verify, and document all calibration of field equipment.
- Inspect all field notes to ensure that all field personnel document the required information.
- Track samples as fieldwork proceeds on field sampling forms and the logbook.
- Prepare Daily Quality Control Reports discussed in Section 8.4.

8.4 DAILY QUALITY CONTROL REPORTS

The field team will complete DQCRs daily during the site activities. The DQCRs will be dated and signed by a field team representative and stored in project files weekly. If significant modifications to the SAP are required, USACE will be contacted immediately. The DQCR form is included in Appendix B. Attachments to the DQCR may include quality assurance sample tables, chain-of-custody records, field screening results, and any other pertinent project forms. The DQCR will contain, at a minimum, the following information:

- Location at time of sampling.
- Field instrument measurements.
- Field instrument calibrations.
- Departures from the SAP.
- Discussion of problems encountered and resolutions.
- Instructions from USACE.

9.0 CORRECTIVE ACTIONS

The ultimate responsibility for maintaining quality throughout the expanded site investigation rests with the URS Project Manager. The day-to-day responsibility for managing field and laboratory activities rests with the URS Field Investigation Task Manager, and the URS Analytical Chemistry Task Manager.

Any nonconformance with the established QC procedures will be expeditiously identified and controlled. Where procedures are not in compliance with the established protocol, corrective actions will be taken immediately. Subsequent work that depends on the nonconforming activity will not be performed until the identified nonconformance is corrected.

The URS Field Investigation Task Manager will review the procedures being implemented in the field for consistency with the established protocols. Tasks such as sample collection, preservation, and labeling will be checked for completeness. Where procedures do not comply with the established protocol, the deviations will be documented and discussed in the report.

10.0 SAMPLING EQUIPMENT AND FIELD INSTRUMENTATION

Standard Operating Procedures for sampling equipment, field instrument operation and calibration are included in Appendix A.

11.0 REFERENCES

URS. 2002. In-Water Investigation Report, Bradford Island Landfill.

URS. 2002. Technical Memorandum, In-Water Removal Work, Bradford Island Landfill.

U.S. Army Corps of Engineers. 2002a. Detailed Statement of Work Contract No. DACW57-99-D-0005, URS Greiner Woodward Clyde Delivery Order No. 0004, Modification No. 0006, Bradford Island Post Removal Sampling.

U.S. Army Corps of Engineers. 2002b. Sampling and Analysis Plan, Bonneville Forebay Sediment Characterization. July 2002.

U.S. Army Corps of Engineers. 2001. Environmental Quality, Requirements for the Preparation of Sampling and Analysis Plans, EM200-1-3.

U.S. Army Corps of Engineers. 2000. First Powerhouse, Bonneville Dam, Columbia River, Oregon, Report 2, Tracking Velocities Hydraulic Model Investigation. Robert Davidson, April.

U.S. Army Corps of Engineers 1998. Navigation Conditions at Bonneville Locks and Dam, Columbia River, Ronald T. Wooley. February.

U.S. Army Corps of Engineers 1991. Bonneville Navigation Lock Sediment Evaluation, Jim Britton, September 6.

U.S.G.S. Topographic Map, 7.5 minute series, Bonneville Dam Quadrangle, Washington – Oregon, 1994.

TABLES



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TABLES

TABLE 2-1
Subcontractors and Services

Subcontractor	Service	Address and Contact
Contract Laboratory – To be determined	Analysis	To be determined
David Evans and Associates, Inc. ¹	Surveying	2828 SW Corbett Avenue Portland, OR 97201 Contact: Joanna Hawkins (503) 223-6663
Advanced American Diving ¹	Diving	415 S. McLoughlin Blvd. Oregon City, OR 97045 Contact: Mike Johns (503) 650-8207

¹These companies have not been contracted. It is anticipated that these companies will be contracted due to extensive previous site experience and site knowledge.

TABLES

TABLE 4-1
Sample Summary

Sample Number	Sample Group	Description	Sampling Method	No. Surface Samples (0-6")	No. Subsurface Samples (6-18")	Sample Analysis
Source Area Sampling						
1	Temporal	Collect samples in Pile #1 and #2 in locations that were previously sampled and exhibited high PCB concentrations.	Diver with a stainless steel spoon	4	0	PCB Aroclors by EPA Method 8082, total organic carbon by EPA Method 9060, grain size by ASTM D422
2	Grid	Collect unbiased samples in tight grid in area encompassing former debris pile areas and drain outfall area.	Box core or grab sampler (Van Veen or ponar) or a diver with a stainless steel spoon	36	8	Full analytical suite*
3	Transect	Collect samples from 14 transects extending from former debris piles and catch basin outfall area.	Box core or grab sampler (Van Veen or ponar) or a diver with a stainless steel spoon	16	6	Full analytical suite*
Potential Depositional Sampling						
4	Depositional	Collect samples in areas of low bottom velocity as modeled by the USACE, including 2 samples at each end sill, the docking area, and the south abutment of Powerhouse 1.	Box core or grab sampler (Van Veen or ponar)	13	13	Full analytical suite*
5	Southeast Side of Bradford Island	Attempt to collect samples along the southeast shore of Bradford Island. Five samples exhibiting fine-grained sediment will be chosen for analysis.	Box core or grab sampler (Van Veen or ponar)	1	1	Full analytical suite*

TABLES

TABLE 4-1
Sample Summary

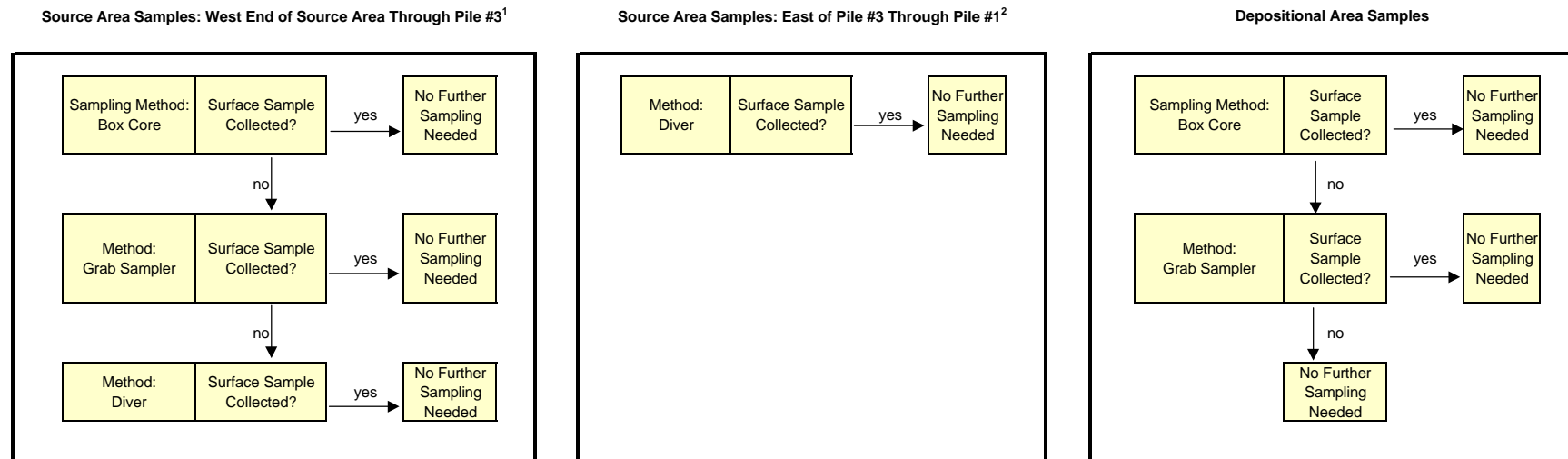
Sample Number	Sample Group	Description	Sampling Method	No. Surface Samples (0-6")	No. Subsurface Samples (6-18")	Sample Analysis
Goose Island						
6	Goose Island	Collect samples in water near the shore of Goose Island and upland on Goose Island.	Box core or grab sampler (Van Veen or ponar)	5**	3**	Full analytical suite*
Other						
7	Fish ladder disposal piles	Collect samples of sediment removed from the east lateral of the Bradford Island fish ladder and disposed of upland on the west end of Bradford Island.	Hand auger	1	0	Full analytical suite*
Reference Sampling						
8	Reference	Collect samples upstream of the site in location not impacted by Bradford Island contaminant sources.	Diver with a stainless steel spoon	2	0	Full analytical suite*
Risk Assessment Sampling						
9	Bioavailability analysis	Analyze samples that exhibit fine-grained characteristics in both source and depositional areas.	Box core or grab sampler (Van Veen or ponar)	10	0	AVS/SEM by EPA Draft 1991, pH by EPA 9045C, Moisture content by ASTM D2216-90
10	Water column	Collect water samples at locations that exhibit fine grained sediment characteristics	Kemmerer Sampler	10	0	Total suspended solids by EPA 160.2, dissolved organic carbon by EPA 415.1, hardness by EPA 130.2, pH by EPA 150.1

*The full suite of parameters is: PCB-Aroclors by EPA Method 8082, metals by EPA Method 6000/7000, semivolatiles by EPA Method 8270C, pesticides by EPA Method 8081A, butyltins by the Krone Method, diesel and heavy oil range organics by NWTPH-Dx, total organic carbon by EPA Method 9060, and grain size by ASTM-D422.

**Six of the samples are sediment samples collected near the shore of Goose Island. Two of the samples are soil samples collected upland on Goose Island six inches below ground surface.

TABLES

Table 4-2
Sampling Method Flowchart



¹Former Pile #3, Grid, and Transect Samples

²Former Pile #3, Temporal, Grid, and Transect Sample Groups

Each sampling method will be attempted three times before attempting a different sampling method.

Subsurface sample collection will be attempted with a box core sampling device. If a subsurface sample is not retrieved with the box core, a subsurface sample will not be collected.

TABLES

TABLE 4-3
Sample Sequence Summary

Sequence	Sample Group	Method	Rational
1	Source Area Samples from east end through Pile #3 (see Figure 4-3) ¹	Standard Sediment Sampling Methods ³	First attempt to retrieve samples with standard sampling equipment. Start in the area closest to spillway in the event the spillway must be opened during the sampling event.
2	Depositional Samples in the Spillway Forebay Area	Standard Sediment Sampling Methods ³	Start in the area closest to spillway in the event the spillway must be opened during the sampling event.
3	Depositional Samples (including the southeast side of Bradford Island samples) in the First and Second Powerhouse Forebays	Standard Sediment Sampling Methods ³	Finish standard sampling event.
4	Goose Island Sediment and Soil Samples	Standard Sediment Sampling Methods ³	Finish standard sampling event.
5	Source Area Samples ²	Diver	Begin diver sampling event in area closest to spillway in the event the spillway must be opened during the sampling event.
6	Reference Samples	Diver	Attempt to match sediment grain size reference samples with site samples.
7	Fish Disposal Pile Sample	Hand Auger	Upland sampling may be conducted at any time during the sampling event.

¹Grid and Transect Sample Groups

²Temporal, Grid, and Transect Sample Groups

³Standard sediment sampling methods are box core or grab samplers.

Note: in locations where water column samples are collected, the water column sample will be collected before the sediment sample is collected.

TABLES

TABLE 4-4
Field QA/QC Samples

Media	Number Collected	Field Quality Control Samples
Sediment	1 per 20 primary samples	Field Duplicate ¹
	1 per 10 primary samples	Field Duplicate ²
	1 per day or 1 per 20 samples (whichever is greater)	Equipment Rinsate Blank
	1 per 20 primary samples	Matrix Spike
	1 per 20 primary samples	Matrix Spike Duplicate
Water	1 per 20 primary samples	Field Duplicate ¹
	1 per 10 primary samples	Field Duplicate ²
	Not Applicable	Equipment Rinsate Blank
	Not Applicable	Matrix Spike
	Not Applicable	Matrix Spike Duplicate

Notes:

¹ = field duplicate samples analyzed by USACE CQAB

² = field duplicate samples analyzed by the contract laboratory

Temperature blanks will be submitted with each cooler

TABLES

TABLE 4-5
Laboratory Container, Preservation, and Holding Times
for Sediment

ANALYTICAL PARAMETER	METHOD	CONTAINER**	PRESERVATION	HOLDING TIMES***
Semivolatile Organic Compounds (SVOCs)	SW8270C	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Polychlorinated Biphenyls (PCBs) - Aroclors	SW8082	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Organochlorinated Pesticides	SW8081A	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Northwest Total Petroleum Hydrocarbons – Diesel Range Organics (NWTPH-Dx)	NWTPH-Dx	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Butyltins	Krone GC/MS	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Metals	SW6020	1-8 oz CWM glass	4 °C	180 days to analyze
Mercury	SW7471A	1-8 oz CWM glass	4 °C	28 days to analyze
Total Organic Carbon (TOC)	SW9060	1-8 oz CWM glass	4 °C	28 days to analyze
Grain Size (Sieve and Hydrometer)	ASTM D422	32 oz CWM	None	None
pH	9045C	1-4 oz CWM glass	4 °C	Upon receipt
Moisture Content	ASTM D2216-90	1-4 oz CWM glass	4 °C	None
Acid Volatile Sulfide (AVS) and Simultaneously Extractable Metals (SEM)	EPA Draft 821/R-91-100****	1-8 oz CWM glass	4 °C	14 days to analyze

Notes:

*Triple volume must be collected for MS/MSD samples.

**Samples collected for analysis for SW8270C/SW8082/SW8081A/NWTPH-Dx /SW6020/ SW7471A/SW9060 may be collected in the same 8 oz CWM jar. Extra sample volume will be collected for archiving in an 8 oz CWM jar.

***Holding times are from date of sample collection.

****EPA Draft document entitled Analytical Method for Determination of Acid Volatile Sulfide and Selected Simultaneously Extractable Metals in Sediment. (December 1991).

All containers will have Teflon-lined seals or septa (i.e.; NWTPH-Gx)

CWM – Clear wide mouth glass jar

TABLES

TABLE 4-6
Laboratory Container, Preservation, and Holding Times
for Water

ANALYTICAL PARAMETER	METHOD	CONTAINER	PRESERVATION	HOLDING TIMES**
Total Suspended Solids (TSS)	EPA 160.2	1-250 ml HDPE	4 °C	7 days
Dissolved Organic Carbon (DOC)***	EPA 415.1	1-250 ml AGJ	4 °C , H ₂ SO ₄ to pH<2	28 days
Hardness	EPA 130.2	1- 125 ml HDPE	4 °C , H ₂ SO ₄ to pH<2	6 months
pH	EPA 150.1	1- 125 ml HDPE	4 °C	Upon receipt

Notes:

*Triple volume must be collected for MS/MSD samples.

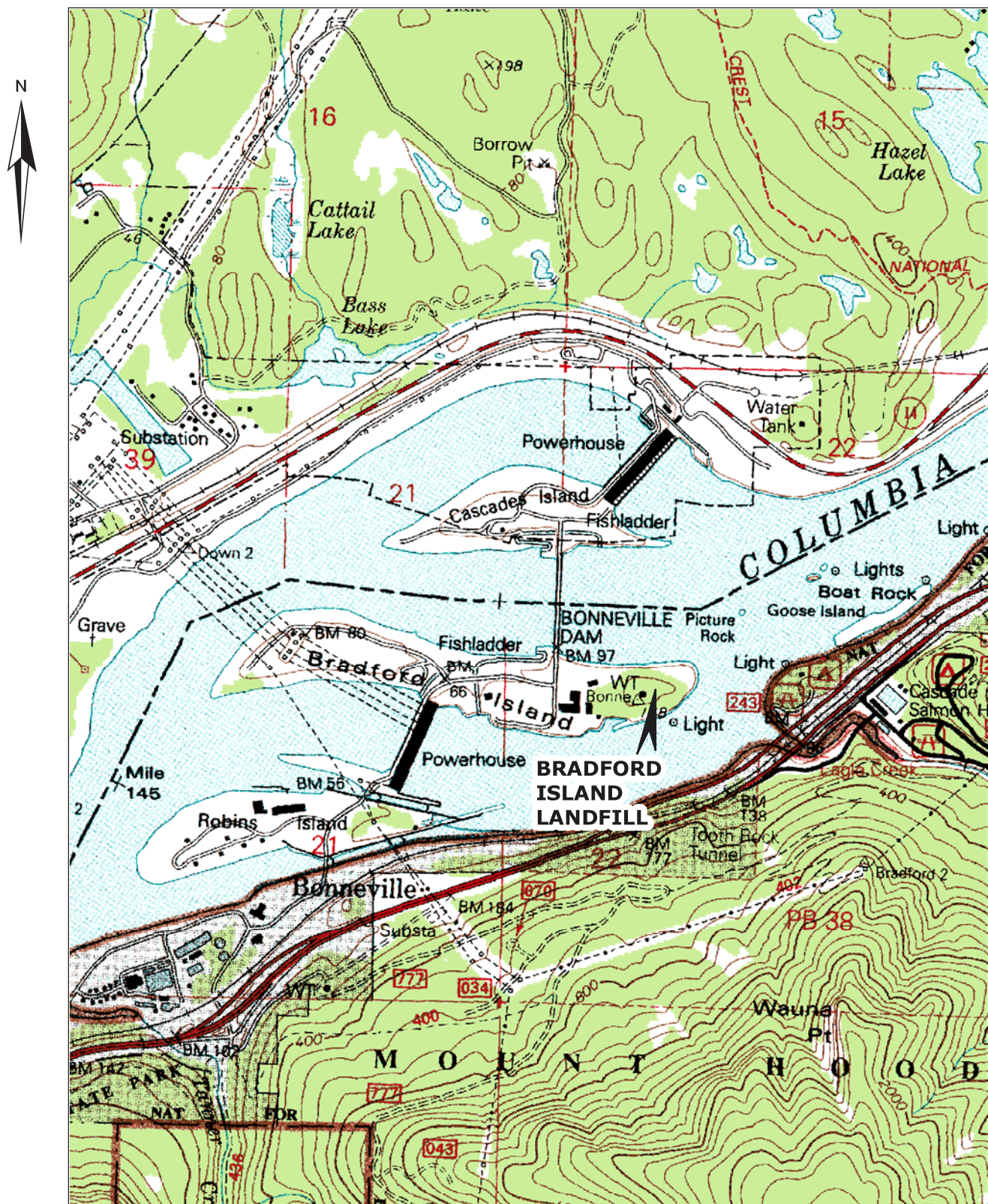
**Holding times are from date of sample collection.

***DOC sample must be field filtered before filling the sample container.

AGJ – Amber Glass Jar

HDPE- High Density Polyethylene Bottles

FIGURES



Source: Bonneville Dam (45121F8) 7.5 Minute USGS Topographic Map

0 1,000 2,000 3,000 Feet

VICINITY MAP

URS

111 SW Columbia, Suite 900
Portland, Oregon

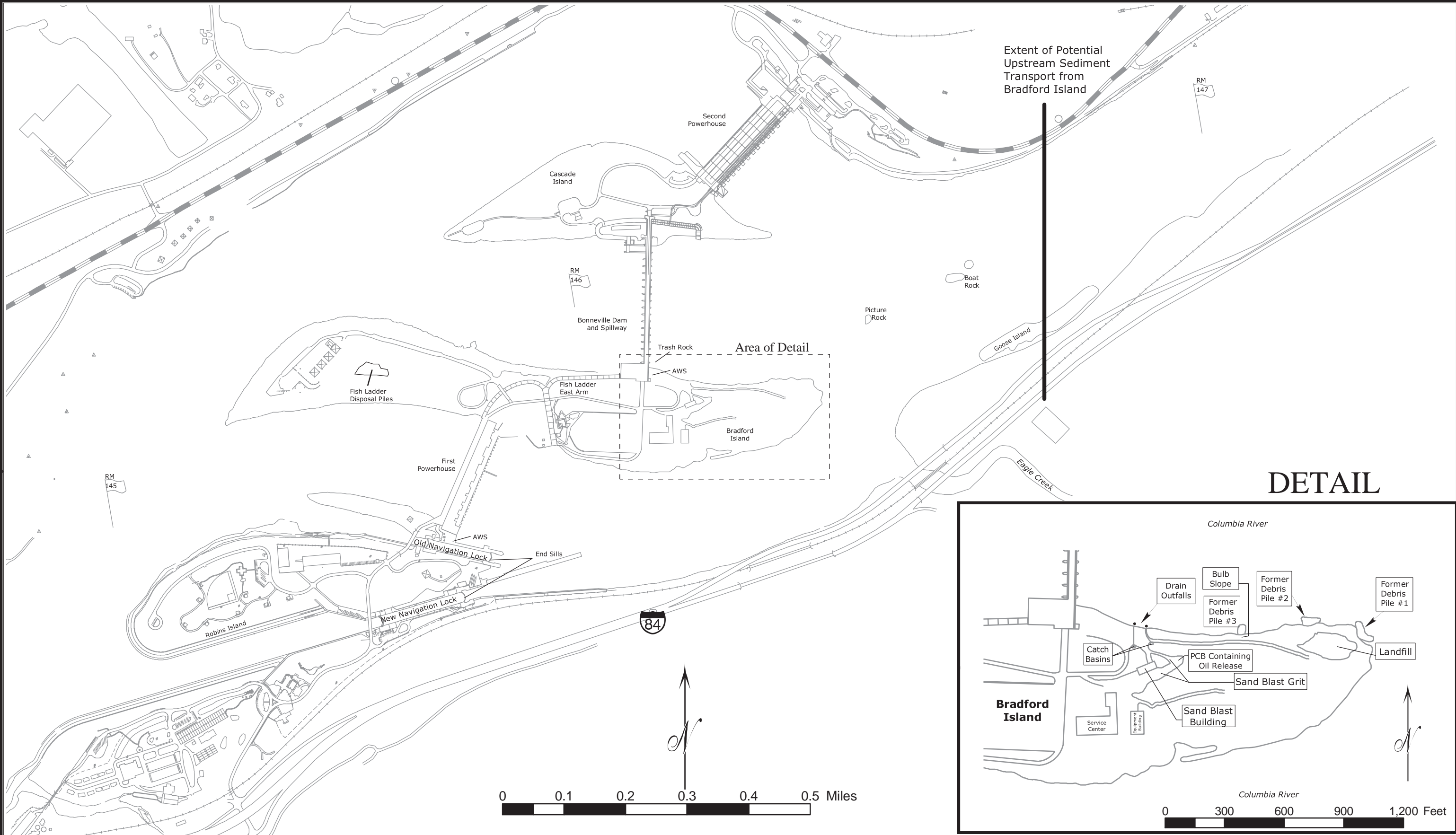
DECEMBER 2002


25692710.00002

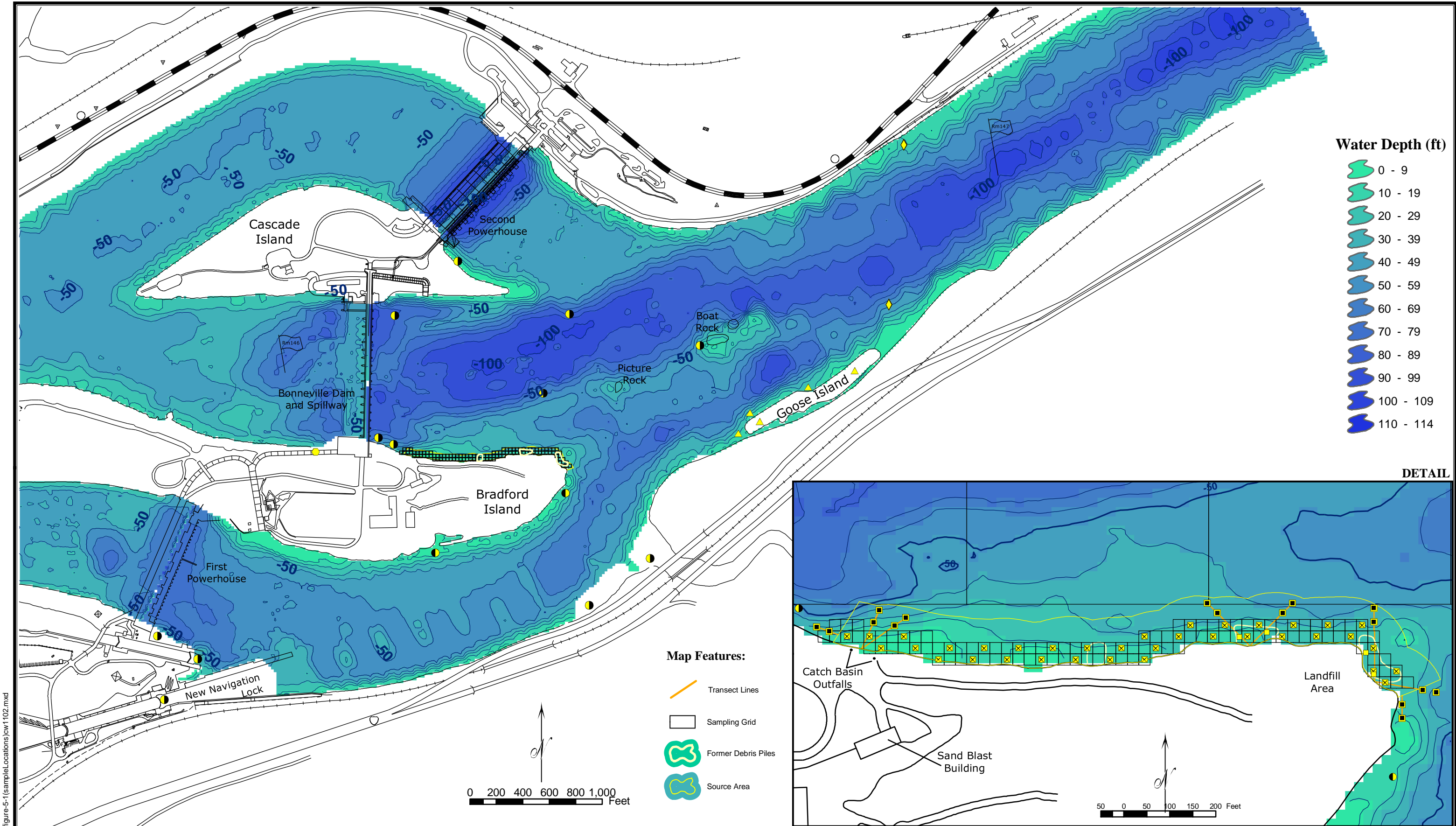
BONNEVILLE DAM FOREBAY
CASCADE LOCKS, OREGON

FIGURE 1-1

k:\bradford_island\apn\figure-2-2(forebay)\11x17- 110702.mxd

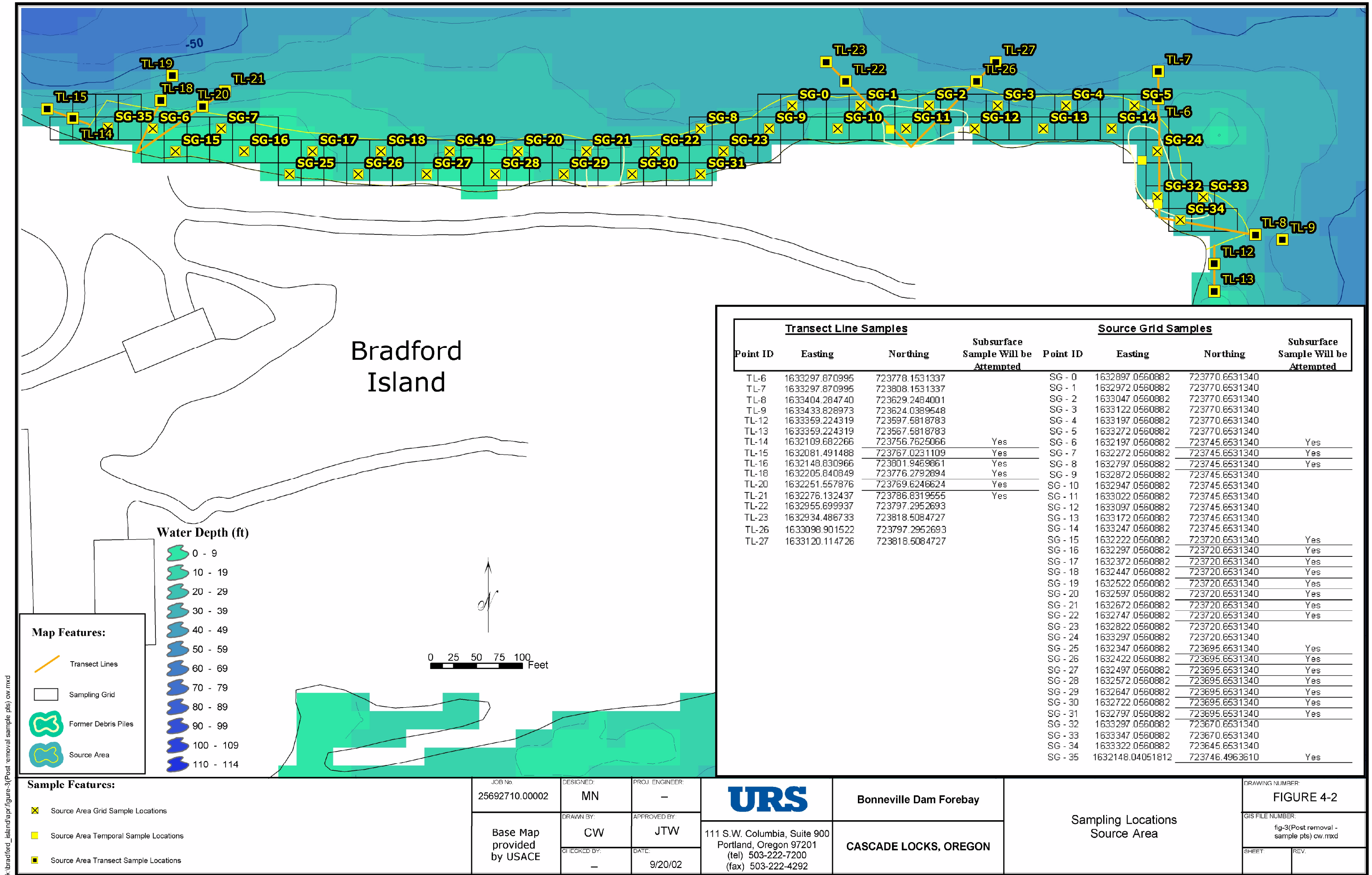


	JOB No. 25692710.00002	DESIGNED: MN	PROJ. ENGINEER: —	 111 S.W. Columbia, Suite 900 Portland, Oregon 97201 (tel) 503-222-7200 (fax) 503-222-4292	Bonneville Dam Forebay CASCADE LOCKS, OREGON	SITE PLAN	DRAWING NUMBER: FIGURE 1-2	
	Base Map provided by USACE	DRAWN BY: CW	APPROVED BY: JTW				GIS FILE NUMBER: figure-1-2(forebay).mxd	
		CHECKED BY: —	DATE: 9/20/02				SHEET:	REV.



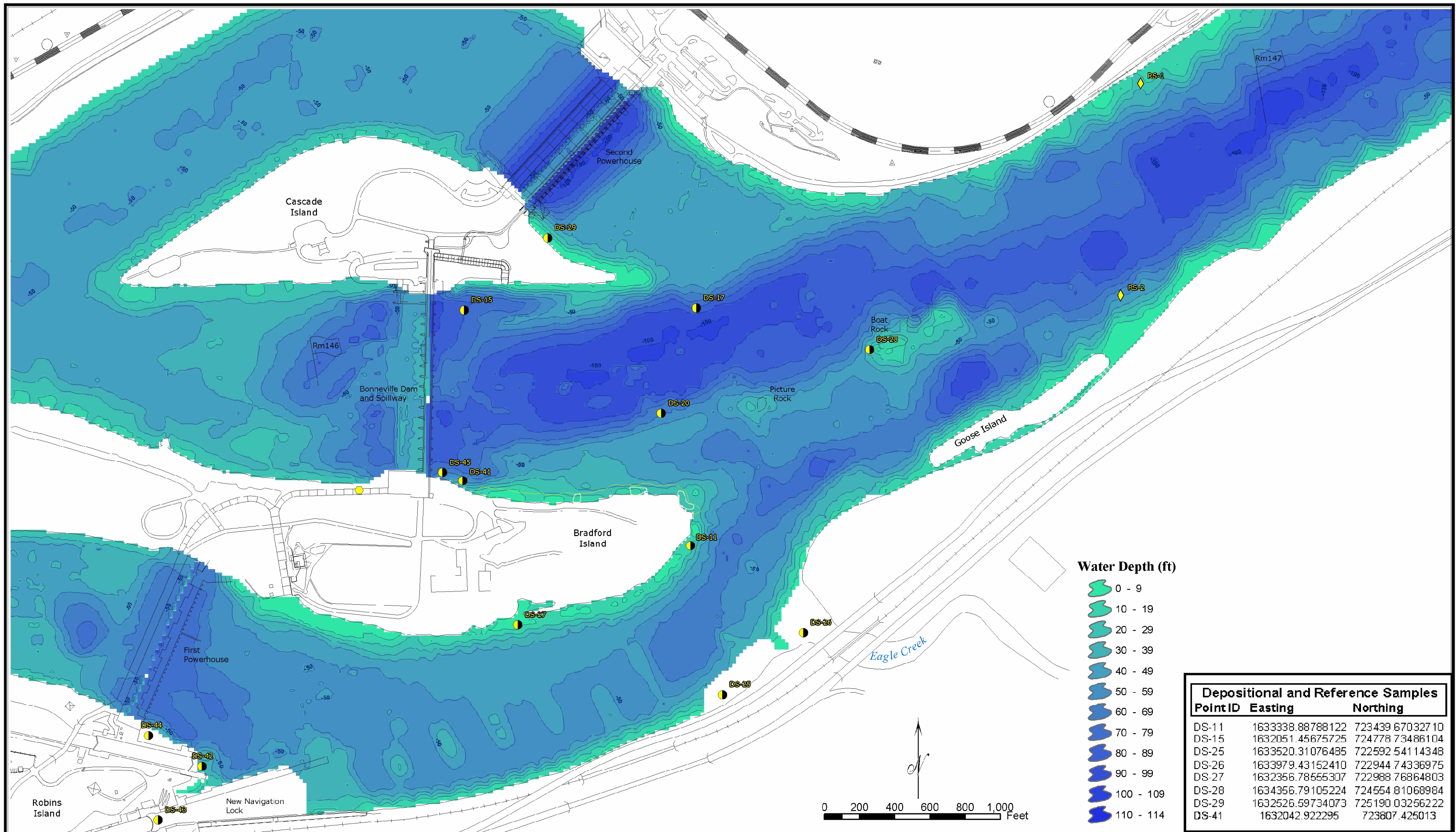
Sample Features: <ul style="list-style-type: none">Source Area Grid Sample LocationsSource Area Temporal Sample LocationsFish Ladder Sediment Disposal Pile Sample LocationSource Area Transect Sample LocationsReference Sample LocationsDepositional Sample LocationsSoutheast Side of Bradford Island sample locationsGoose Island Sample Locations		JOB No. 25692710.00002	DESIGNED: MN	PROJ. ENGINEER: —		Bonneville Dam Forebay	CASCADE LOCKS, OREGON	Sampling Stations	DRAWING NUMBER: FIGURE 4-1	
		Base Map provided by USACE	DRAWN BY: CW	APPROVED BY: JTW					GIS FILE NUMBER: fig-3(Post removal - sample pts) cw.mxd	
			CHECKED BY: —	DATE: 9/20/02					SHEET:	REV.

k:\bradford_island\ap\workplan\figure-5-1(sampleLocations)cw1102.mxd

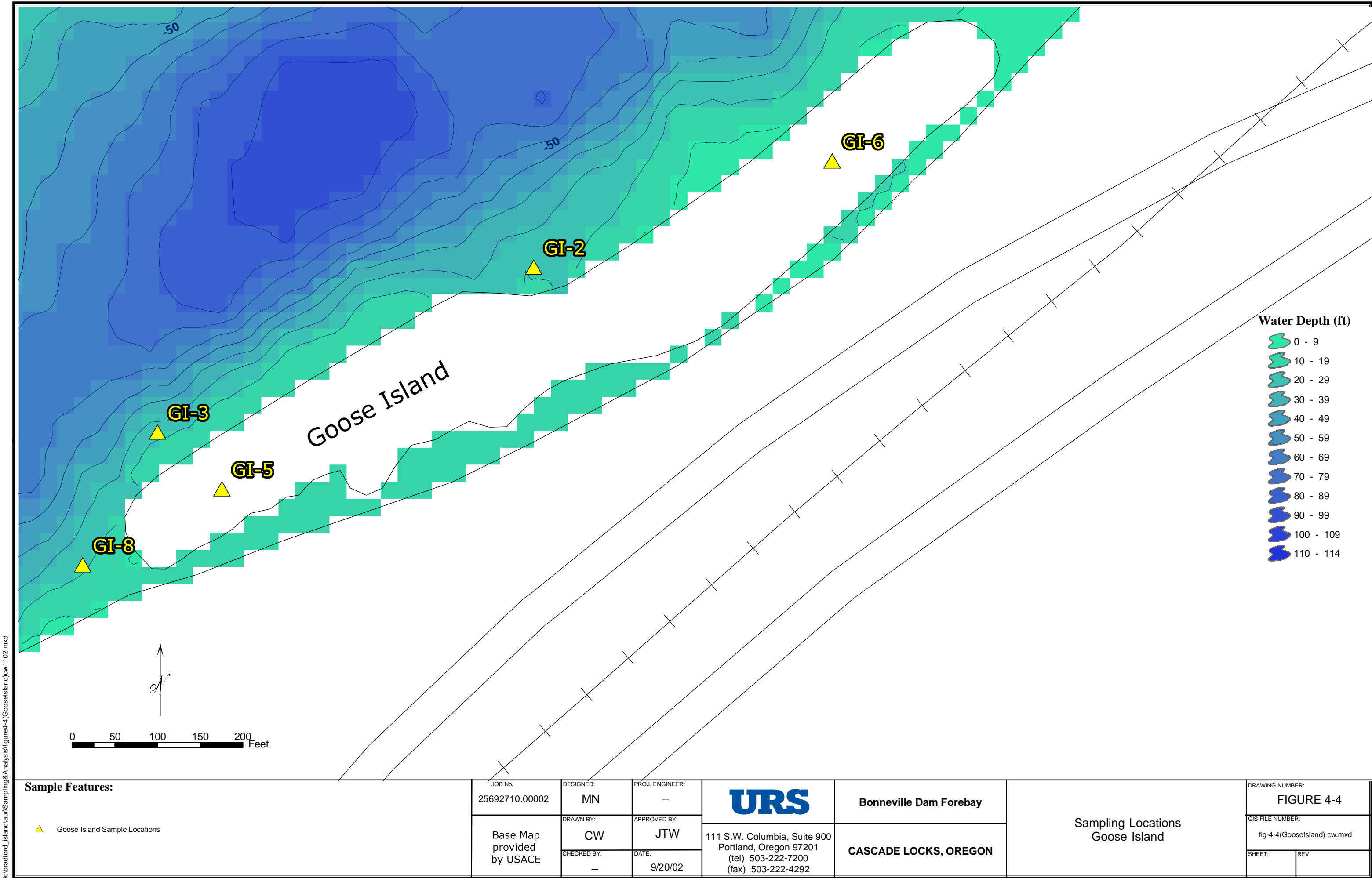


k:\bradford_island\pr\figure-3(Post removal sample pts) cw.mxd

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Sample Features: <ul style="list-style-type: none"> Depositional Sample Locations Fish Ladder sediment disposal pile sample location Southeast Side of Bradford Island Reference Sample Locations	JOB No. 25692710.00002	DESIGNED: MN	PROJ. ENGINEER: —	 111 S.W. Columbia, Suite 900 Portland, Oregon 97201 (tel) 503-222-7200 (fax) 503-222-4292	Bonneville Dam Forebay CASCADE LOCKS, OREGON	Sampling Locations Depositional and Reference	DRAWING NUMBER: FIGURE 4-3
	Base Map provided by USACE	DRAWN BY: CW	APPROVED BY: JTW				GIS FILE NUMBER: fig-4-3(Dep&REF) cw1102.mxd
		CHECKED BY: —	DATE: 9/20/02				SHEET: REV:



k:\bradford_island\api\Sampling&Analysis\figure4-4(GooseIsland)cw1102.mxd

Sample Features:

Goose Island Sample Locations

JOB No.
25692710.00002

DESIGNED:
MN

PROJ. ENGINEER:
—

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Portland, Oregon 97201
(tel) 503-222-7200
(fax) 503-222-4292

Bonneville Dam Forebay

CASCADE LOCKS, OREGON

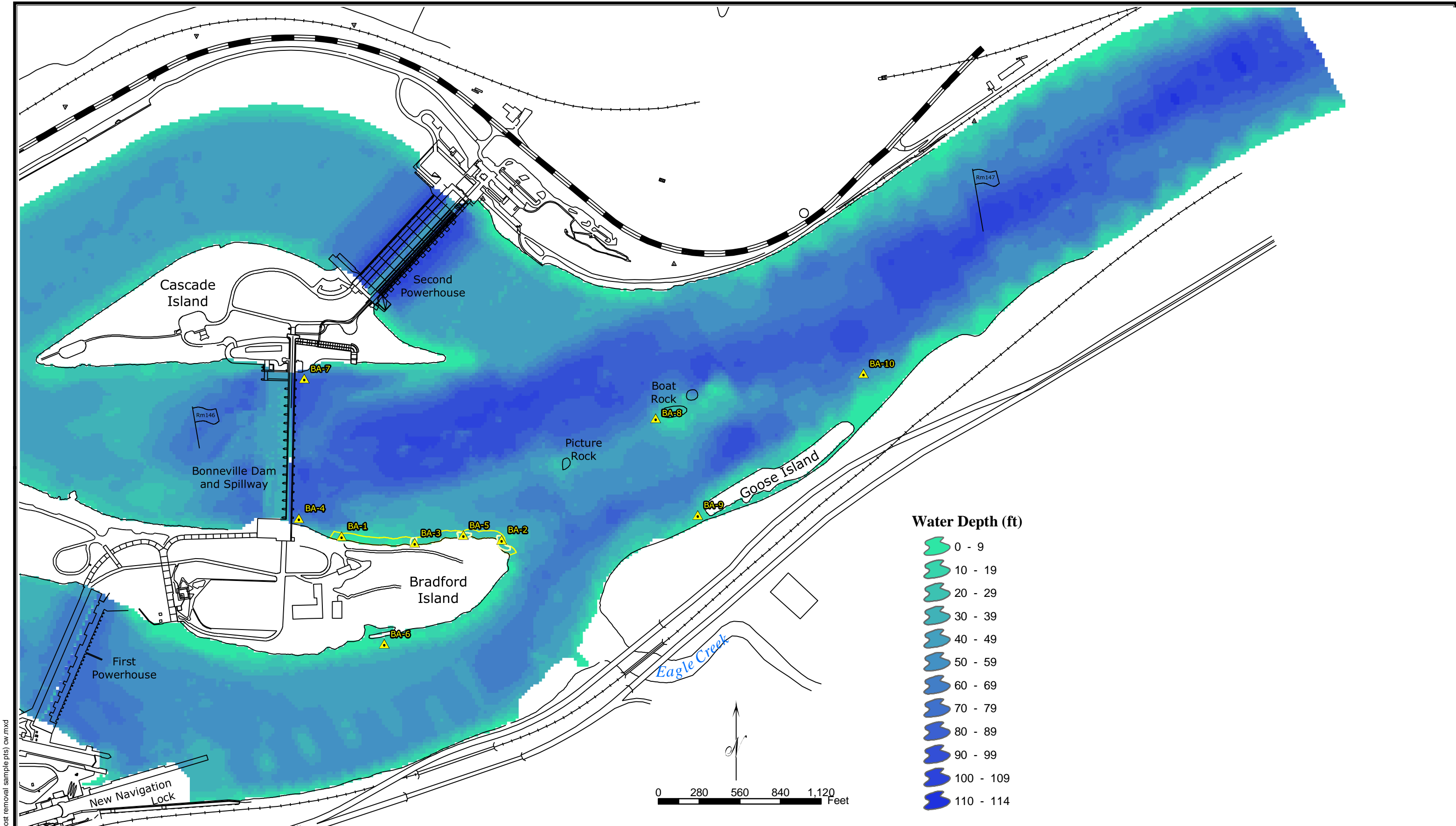
Sampling Locations
Goose Island

DRAWING NUMBER:
FIGURE 4-4

GIS FILE NUMBER:
fig-4-4(GooseIsland) cw.mxd

SHEET:


REV.



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Sample Features:

 Bioavailability and Water Column Samples

Base Map provided by USACE	JOB No. 25692710.00002	DESIGNED: MN	PROJ. ENGINEER: —	 111 S.W. Columbia, Suite 900 Portland, Oregon 97201 (tel) 503-222-7200 (fax) 503-222-4292	Bonneville Dam Forebay	Sampling Locations Bioavailability and Water Column Samples	DRAWING NUMBER: FIGURE 4-5	
		DRAWN BY: CW	APPROVED BY: JTW				GIS FILE NUMBER: fig-4-5(Bioavailability and WaterColumn) cw1102.mxd	
		CHECKED BY: —	DATE: 9/20/02		CASCADE LOCKS, OREGON		SHEET:	REV.

Using visual examination techniques, the sediment samples will be described in the field in general accordance with the Unified Soil Classification System.

Specific sample criteria to be noted includes:

- Sediment Name
- USCS Group Symbol
- Color (Munsell Soil Color Charts, revised 1992)
- Grain size and distribution
- Soil particle lithology
- Gradation
- Plasticity
- Bedding or sedimentary structures
- Chemical precipitates
- Organic material
- Moisture content
- Background odor

Other observations, such as field screening data, visual evidence of contamination or lack thereof, or the presence of debris will also be noted. Observations will be recorded on the field-sampling sheet for future reference. An example Field Sampling Data Sheet is presented in Appendix B. Other information to be noted on the Field Sampling Data Sheet include:

- Project name and location
- Project number
- Geologist's name
- Sample number
- Sample location

Sediment

This SOP describes the decontamination procedures for any non-dedicated sampling equipment, which comes into contact with potentially contaminated sediment. Equipment will be decontaminated as follows:

1. Soap wash (dilute solution of Alconox or equivalent in potable water solution),
2. Distilled water rinse,
3. Hexane rinse,
4. Distilled water rinse.

Any decontamination fluids will be containerized and marked in accordance with Section 7 of this FSP.

Water

This SOP describes the decontamination procedures for any non-dedicated water sampling equipment. Equipment will be decontaminated as follows:

1. Soap wash (dilute solution of Alconox or equivalent in potable water solution),
2. Distilled water rinse,

Any decontamination fluids will be containerized and marked in accordance with Section 7 of this FSP.

This SOP describes the procedure used to collect sediment samples with a box corer.

1. Assemble the coring device by inserting the acetate core into the sampling tube.
2. Insert the check valve mechanisms into the tip of the sampling tube with the convex surface positioned inside the acetate core.
3. Lower the box corer to within approximately six feet of the river bottom using an electric winch.
4. Release the cable when the corer is in position to allow sharp drop into sediment.
5. Immediately after core penetration, reestablish tension on the cable to establish vertical stability.
6. Retrieve the corer with the electronic winch.
7. Lift the corer off of the core liner.
8. Siphon any supernatant water from the surface of the sample being careful to retain fine sediments.
9. Measure core length.
10. Push sediment core upward 6 inches.
11. Inspect and describe core.
12. Collect sample for laboratory submission.
13. Push sediment core upward to collect sample from the 6 to 18 inch interval.

A grab sampler (a Van Veen or ponar sampler) is a 'clamshell' like device that operates using a cantilever trip system. This SOP describes the procedure used to collect sediment samples with a grab sampler.

1. Attach the sampler to an electric winch.
2. Arrange the sampler in the open position, setting the trip bar so the sampler remains open when lifted.
3. Slowly lower the sampler to a point just above the sediment.
4. Drop the sampler sharply into the sediment, then pull sharply up on the line, releasing the trip bar and closing the dredge.
5. Raise the sampler to the surface and slowly decant any free liquid through the screens on top of the dredge. Be careful to retain fine sediments.
6. Open the dredge and transfer the sediment to sampling containers.

A Kemmerer water sampler is a depth-discrete sampler constructed of PVC. This SOP describes the procedure used to collect sediment samples with a grab sampler.

1. Attach the sampler to a cable with depth measurements and to the water quality meter.
2. Deploy the sampler (along with the meter) in the water in the open position, lowering the sampler until the river bottom is reached.
3. Reel up the sampler six inches and wait approximately three minutes for disturbance created by the sampler to dissipate.
4. Take water quality readings for pH, turbidity, dissolved oxygen, conductivity, reduction-oxidation potential, and temperature.
5. Send the messenger down the cable to activate closure.
6. Retrieve the water sample.
7. Agitate the sampler to re-suspend any solids prior to filling sample bottles.
8. Sample bottles not requiring filtration will be filled directly from the sampler.
9. For sample bottles requiring filtration, a disposable 0.7-micron in-line filter will be attached to tubing.
10. Fill the appropriate sample bottles for dissolved parameters with the filtered sample water.

Field Measurement of Water Quality Parameters

Field measurements of water quality parameters will be made with a portable, battery powered water quality meter, such as a Horiba-U22. This SOP describes the procedure used to measure pH, specific conductance, temperature, turbidity, reduction-oxidation potential, and dissolved oxidation in the water column.

1. Calibrate the instrument according to the manufacturer's instructions at the beginning of the day and when deemed necessary.
2. Rinse the sample probe with distilled water.
3. Deploy the water quality meter with the Kemmerer water sampler (see SOP 5).
4. Reel up the sampler six inches and wait approximately three minutes for disturbance created by the sampler to dissipate.
5. Wait for readings to stabilize.
6. Record readings for pH, specific conductance, temperature, turbidity, reduction-oxidation potential, and dissolved oxidation.

Bradford Island Post Removal Sediment Sampling

Sample Number:	Date:	
Weather Conditions:	Time:	
Analyses		
_____PCB-Aroclors	_____VOCs	_____ % Moisture
_____PCB – Congeners	_____Pesticides	_____AVS/SEM
_____Metals	_____Butyltins	_____Grain Size
_____SVOCs	_____Diesel/Heavy Range Organics	_____pH
_____PAHs		_____TOC
Sample Collection		
Sampling Method:		
QC Samples Collected:		
Water Sample Collected:		
Decontamination Method:		
Sample Team:		
Sample Location		
Latitude: _____ N		
Longitude: _____ W		
Description of Location:		
Description of River Bottom:		
Water Depth:		
Sediment Depth:		
Sediment Description		
Color:		
Texture:		
UCSC Classification:		
Odor/sheen:		
Benthic Organisms:		
Depth of bioactive layer:		
Vegetation:		
Other Comments		

Bradford Island Post Removal Water Sampling

Sample Number:	Date:	
Weather Conditions:	Time:	
Analyses		
_____PCB-Aroclors	_____VOCs	_____TSS
_____PCB – Congeners	_____Pesticides	_____Hardness
_____Metals	_____Butyltins	_____pH
_____SVOCs	_____Diesel/Heavy Range Organics	_____TOC
_____PAHs		_____DOC
Sample Collection		
Sampling Method:		
QC Samples Collected:		
Sediment Sample Collected:		
Decontamination Method:		
Sample Team:		
Sample Location		
Latitude: _____ N		
Longitude: _____ W		
Description of Location:		
Water Depth:		
Water Quality Readings		
pH		
Turbidity		
Dissolved Oxygen		
Conductivity		
Reduction-Oxidation Potential		
Temperature		
Other Comments		



DATE _____

DAY

S	M	T	W	TH	F	S
---	---	---	---	----	---	---

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

PROJECT MANAGER _____

PROJECT _____

JOB No. _____

CONTRACT No. _____

SUB-CONTRACTORS ON SITE:

EQUIPMENT ON SITE:

WORK PERFORMED (INCLUDING SAMPLING):

SHEET _____ OF _____

DAILY QUALITY CONTROL REPORT

REPORT No. _____

DATE _____

QUALITY CONTROL ACTIVITIES (INCLUDING FIELD CALIBRATIONS):

HEALTH AND SAFETY LEVELS AND ACTIVITIES:

PROBLEMS ENCOUNTERED/CORRECTION ACTION TAKEN:

SPECIAL NOTES:

TOMORROW'S EXPECTATIONS:

BY _____ TITLE _____